



HISTORICALLY BLACK COLLEGES AND UNIVERSITIES

NASA TECHNOLOGY INFUSION

ROAD TOUR



AND MINORITY-SERVING INSTITUTIONS

California State University, Los Angeles

Dr. Scott Bowman



Technology Infusion Road Tour Presentation Outline

- University Curriculum
- University Programs and Degrees
- Past Performance (Contracts & Subcontracts)
- University Points of Contacts

University Curriculum

- The Cal State LA curriculum has three components: a major, general education (GE) requirements, and electives.
- The major complements the breadth of the GE requirements and provides an opportunity to contend with the depth of knowledge and the complexities of developing knowledge in a particular area of inquiry.
- The GE requirements consist of integrated, often interdisciplinary, courses and sequences.
- Electives provide scope to student's work in the university whereby courses are chosen that reflect their interests.

Examples of University Curricula

Chemistry (B.S.) Curriculum

- General Chemistry (1 semester)
- Quantitative Chemistry (1 semester)
- Organic Chemistry (2 semesters)
- Physical Chemistry (2 semesters)
- Analytical Chemistry (2 semesters)
- Calculus (3 semesters)
- Physics (2 semesters)
- Inorganic Chemistry (1 semester)
- Biochemistry (1 semester)
- Advanced synthetic methods (1 semester)
- Undergraduate research (varies)
- Capstone course ((1 semester)
- General Education Requirements (throughout program)
- Upper division theme (1-2 semesters)

Physics (B.S.) Curriculum

- Physics and Modern Physics (3 semesters)
- General Chemistry (2 semesters)
- Calculus (3 semesters)
- Biology (2 semesters)
- Organic Chemistry (2 semesters)
- Basic Electronics (1 semester)
- Physics Computing (1 semester)
- Thermodynamics (1 semester)
- Biophysics (1 semester)
- Option: Quantum mechanics or Statistical physics (1 semester)
- Electives (varies)
- General Education Requirements (throughout program)
- Upper division theme (1-2 semesters)

University Programs and Degrees

- Biology (B.S., M.S.); Microbiology (B.S.)
- Biochemistry (B.S.)
- Chemistry (B.S., M.S.) also M.S. with a Biochemistry option
- Civil Engineering (B.S., M.S.)
- Computer Science (B.S., M.S.)
- Electrical Engineering (B.S., M.S.)
- Environmental Sciences (M.S.)
- Food Science and Technology (B.S.)
- Geology (B.S., M.S. in Geological Sciences) (minor in Geology)
- Kinesiology (B.S., M.S.)
- Mathematics (B.S., M.S., and minor)
- Nutritional Science (B.S., M.S.)
- Mechanical Engineering (B.S., M.S.)
- Physics and Astronomy (B.A., B.S., M.S., and minor)

Research Capabilities

- **Biomedical Research:** Cell fate and differentiation in early tissue development, contributions of mitochondrial biology and cellular metabolism to disease, craniofacial development, fungal pathogenesis, innate mucosal immunity, physical activity and antidepressant treatment interactions in the brain, novel antibiotic drug discovery, mechanisms of antibiotic resistance, cardiovascular metabolism, developmental neurobiology, RNA metabolism, p53, drug-protein interaction, protein modification, microfluidic platforms for point-of-care diagnostics.
- **Chemistry:** Microfluidics, point-of-care (POC) diagnostic devices, fuel cells, chip fabrication, electro- and photocatalysis, nuclear magnetic resonance, nanoparticles and hydrogels for drug-delivery, protein methylation, function, photovoltaics, chemometrics, structure-function relationships in proteins, photochemistry, signal transduction pathway determination.

Research Capabilities

- **Mathematics/Computer Science:** Probability theory, math modeling, topology, computer networks, software engineering and operating systems, computer system architecture.
- **Physics/Engineering:** Multiferroic materials and characterization, nuclear magnetic resonance, theoretical physics of materials, superconducting materials, computational materials science, thermal and fluid sciences, machine design, solidification modeling, power systems dynamics, modeling, and analysis, neural networks, computer architecture.
- **Forensic Science:** Trauma and traumatic stress, community policing, hate crimes, miRNA markers for detection of wound cells in bloodstains, modeling of bloodstain pattern, time-of-death determination, mtDNA, trace evidence, sexual assault, pharmacology and toxicology of controlled substances, neurocriminology.

Research Capabilities

- **Health Disparities:** Drug abuse, dietary and strength training intervention for overweight minority youth, risk factors in overweight Latino youth, HIV, health communication, risk factors influencing sex and drug related behaviors of transgender women and gay men, STI prevention in at-risk youth and young adults, dementia, hypertension among Arab Americans, adherence issues, behavioral health, adherence and type 1 and type 2 diabetes, mental health disparities
- **Environmental Science:** Environmental geochemistry, igneous petrology, volcanology, hydrogeology, groundwater modeling, air pollution, hydrologic modeling, remote sensing, GIS, computer cartography, sedimentary petrology, climatology, meteorology, global environmental changes, environmental microbiology, strength properties of soils, air quality control and modeling climate change, hydrology and water resource
- **Supply Chain and Logistics:** Support decision making, operations, supply chain management, risk management in supply chain, supply chain innovations, leadership development, labor conditions, relations and negotiations, entrepreneurship, operations/finance interface, cost and managerial accounting.

Past Performance

- **Department of Defense**

Studies include the development of non-contact geophysical methods to determine seabed geotechnical properties through controlled laboratory and field trials and, the development of new sensor application technologies to detect agents found in chemical warfare agents and explosives using non-imaging techniques.

- **Economic Development Agency**

Developed three components for the proof-of-concept Center, LABioStart: a boot camp for bioscience entrepreneurs:

- (1) Regional Innovation Showcases; Created The BioSpace LA Incubator to serve as an economic development hub for bioscience start-up companies and engaging industry partners, students, and faculty.
- (2) Bioscience Entrepreneur's Bootcamp;
- (3) Networking Sessions



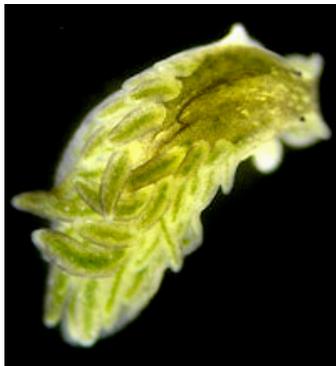
Past Performance

- **National Aeronautics and Space Administration**
The **NASA DIRECT-STEM Program** recruits highly competitive, historically underrepresented students, giving them NASA research experience in scientific computing and data analysis, inspiring them to become future leaders in STEM-related professions. Research and training is collaborative with the University of California, Irvine and Jet Propulsion Laboratory in areas of hydrology and climate change, computational physics, and cloud computing directly contributing to NASA's mission goals.



Past Performance

- National Institutes of Health
- Research includes examining how chemical factors affect antifreeze protein activity, the mechanism of arginine methylation and its role in preventing aberrant gene activation, signal transduction of proteins, development of novel biosensors for neurotransmitters, and development of new molecular dynamics simulation methodologies for DNA structure analysis.

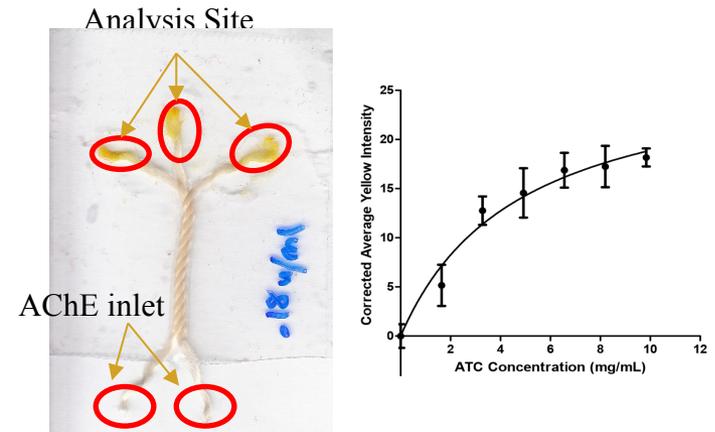


Solar-powered slugs.

A. **RXRXXS/TXXXX**



Figure 2. A) Optimal Akt phosphorylation motif. B) Site of phosphorylation. C) Methylation of arginine within the phosphorylation motif preventing phosphorylation.

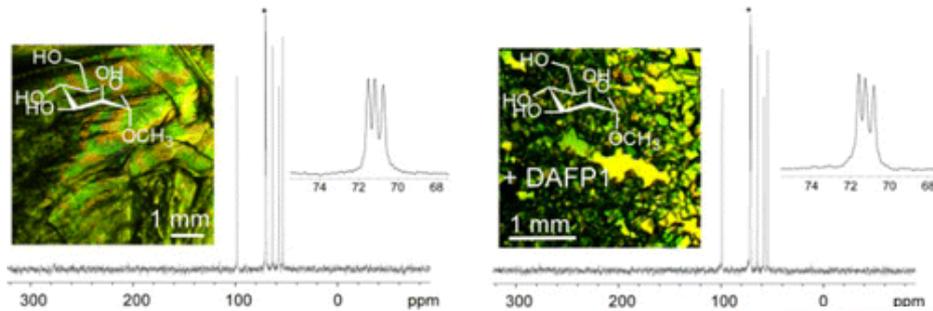


Assay for acetylcholinesterase.

Past Performance

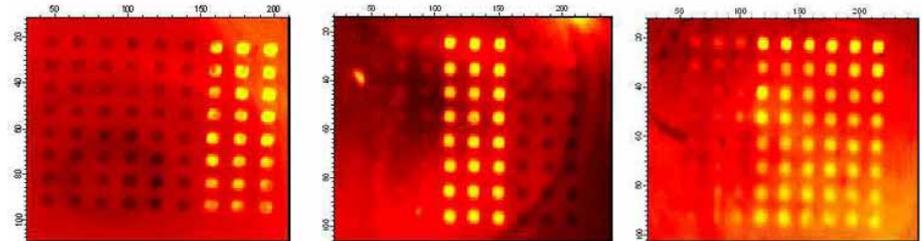
- National Institutes of Health

Training programs for students interested in developing research careers in biomedical and behavioral research include the **Minority Opportunities in Research (MORE)** office funded by grants from the National Institute of General Medical Sciences (NIGMS).



The crystal morphology of methyl α -D-mannopyranoside (MDM) crystals can be effectively controlled by antifreeze proteins.

Hybridization using a microarray assembly.



(A)

(B)

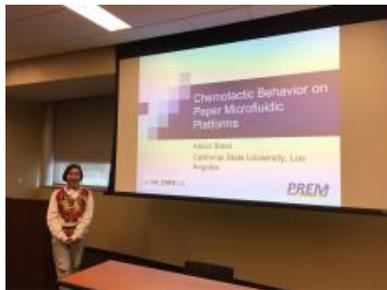
(C)

Past Performance

- National Science Foundation

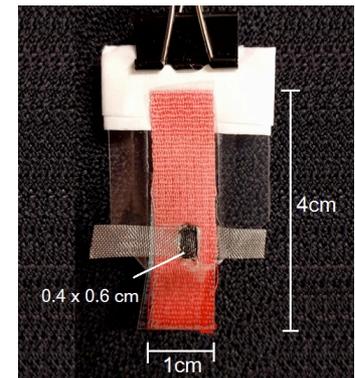
Center for Energy and Sustainability (CEaS): microfluidic fuel cells, advanced materials for photovoltaics, and applications of high-temperature superconductors.

Partnership for Research and Education in Materials (PREM): magnetic and ferroelectric properties of manganites, photoelectrocatalysis on perovskite metal oxides, development of catalytic nanopumps on microfluidic platforms, development of CSULA's Master of Science Degree in Materials Science and Engineering.



Student conference research presentation.

Microfluidic fuel cell.



University Points-of-Contact

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